

Despite advancements in gender equality, women remain underrepresented in STEM fields. According to a National Science and Engineering Statistics study, the share of women and underrepresented minorities in the STEM workforce increased between 2011 and 2021. In 2021, about two-thirds (65%) of those employed in STEM occupations were men, and about one-third (35%) were women. This disparity is due to various factors, including societal stereotypes, lack of role models, and limited access to STEM education and resources, especially for girls from marginalized communities. The *Changing the Faces of STEM - Empowering Girls to be Tomorrow's STEM Leaders* project aims to address these challenges by providing girls with opportunities, resources, and support to empower them to pursue STEM fields.

This project's overarching goal is to create a curriculum that will empower girls to excel in STEM by providing them with the knowledge, skills, confidence, and opportunities they need to succeed. The specific objectives include:

- Increase girls' interest and participation in STEM fields.
- Improve girls' STEM skills, critical thinking abilities, and problem-solving capabilities.
- Foster a supportive and inclusive STEM environment that values diversity and promotes equity.

The South Carolina Science and Engineering Practices (SEPs) encompass the major practices that scientists apply as they investigate and build models and theories about the world, which engineers use to design and build systems. This project will address all six of the South Carolina Middle School SEPs. It will also address several SC State Standards and crosscutting concepts not limited to:

8-LS1-5. Construct a scientific explanation based on evidence for how environmental and genetic factors influence the growth of organisms.

7-LS2-4. Construct an argument supported by empirical evidence that changes to physical or biological components of an ecosystem affect populations.

7-LS1-7. Develop a model to describe how food molecules in plants and animals are rearranged through chemical reactions, forming new molecules that support growth and/or release energy as this matter moves through an organism.

7-PS1-2. Analyze and interpret data on the properties of substances before and after the substances interact to determine if a chemical reaction has occurred.

6.RP.3 Apply the concepts of ratios and rates to solve real-world and mathematical problems.

6.GM.1 Find the area of right triangles, other triangles, special quadrilaterals, and polygons by composing them into rectangles or decomposing them into triangles and other shapes; apply these techniques in the context of solving real-world and mathematical problems.

7.GM.1 Determine the scale factor and translate between scale models and actual measurements (e.g., lengths, area) of real-world objects and geometric figures using proportional reasoning.

The proposed materials in this grant will be used to meet the above goals and objectives. The results will be measured qualitatively and quantitatively. The materials will be utilized as follows:

**Girls Garage:** Teaching girls how to use power tools, create and follow blueprints, and engineer structures is a transformative aspect of promoting girls in STEM initiatives. These hands-on experiences will not only equip girls with practical skills but also ignite their curiosity, creativity, and confidence in STEM fields. The girls will develop problem-solving abilities and critical thinking skills essential for success in STEM disciplines by engaging in activities such as constructing structures, assembling projects, and troubleshooting designs. The girls will develop

these skills while simultaneously completing projects promoting positivity at our school such as buddy swings, picnic tables, and a bridge over a stream. Moreover, mastering these technical skills empowers girls to envision themselves as capable contributors in traditionally male-dominated fields like engineering and construction, breaking down barriers and inspiring a new generation of female STEM leaders.

**STEM Chefs:** This aspect of the curriculum would utilize the free curriculum available through the Betty Crocker Cooking Lab ([BettyLab](#)) to inspire girls to pursue STEM careers by merging the art of cooking with science, technology, engineering, and mathematics. Through hands-on culinary experiments, girls learn about the chemistry of food, the physics of cooking techniques, the mathematics of measurements and proportions, and the technology behind kitchen appliances. This interdisciplinary approach not only makes STEM concepts more accessible and relatable but also fosters a love for experimentation, problem-solving, and creativity. By connecting cooking with STEM education, this initiative will show girls that STEM is everywhere in their daily lives, sparking curiosity and passion for these subjects. Additionally, it will emphasize the importance of nutrition, sustainability, and food science, highlighting potential STEM career paths in food technology, nutrition science, culinary arts, and more.

**Girls that Code:** Learning to code is essential in today's digital age as it equips individuals with problem-solving skills, computational thinking abilities, and a deeper understanding of technology. Coding empowers individuals to create, innovate, and express themselves in various ways. For example, using Ozobot robots introduces coding concepts in a tangible and interactive manner, fostering creativity and logical thinking among learners. Additionally, building a video game system not only enhances coding skills but also encourages collaboration, design thinking, and project management. These experiences will prepare individuals for future careers in technology and enable them to contribute meaningfully to a rapidly evolving digital world.

**Girls that solve Crime:** A forensics unit can be a powerful tool for building STEM skills and encouraging girls to pursue careers in STEM fields. Through hands-on activities like crime scene investigation, forensic analysis, and scientific experimentation, students will develop critical thinking, problem-solving, and analytical skills essential in STEM disciplines. Integrating technology such as digital forensics tools and data analysis software adds a modern dimension to the unit, exposing students to cutting-edge techniques used in real-world investigations.

**Girls for the Environment:** Engaging girls in activities focused on raising environmental awareness and water ecology can significantly contribute to building their STEM skills and encouraging them to pursue careers in STEM fields. Through hands-on experiences like water quality testing, data analysis, and environmental monitoring, girls will develop critical thinking, problem-solving, and scientific inquiry skills. These activities also foster a deeper understanding of ecological systems, sustainability principles, and the interconnectedness of human actions with the environment. By emphasizing the importance of environmental stewardship and showcasing the real-world applications of STEM in addressing environmental challenges, girls are inspired to explore STEM-related pathways and envision themselves as future leaders and innovators in fields such as environmental science, ecology, hydrology, and conservation biology. The combination of practical skills development and environmental advocacy creates a compelling platform for empowering girls to make meaningful contributions to environmental

conservation and sustainable development, shaping a more diverse and inclusive future in STEM.

The lessons and resources used in this project will be shared during a professional development session with all faculty at my school. The equipment will also be available for the teachers to use and implement while teaching their standards to their students. Per the requirements of the K-12 Catalyst Grant for STEM Education, a Student Impact Report will be submitted that will include an explanation of how the funds were used, a summary of the students impacted by the grant, a brief description of the implementation of the project, any barriers/concerns that arose, evaluations of the students, and at least one photograph and video. The Student Impact Report will be submitted before the last day of school (May 30th, 2025).

Item	Category	Usage	Link	Price
Craftsman Power Tools Combo	Girls Garage	Power tools for construction	<a href="https://rb.gy/af185d">https://rb.gy/af185d</a>	\$199.00 x 2= \$398
5 lbs of Wood Screws	Girls Garage	Screws for wood projects	<a href="https://a.co/d/17iJdEr">https://a.co/d/17iJdEr</a>	\$35.98 x 3= \$107.94
Picnic Table Kit	Girls Garage	Girls will plan, measure and build two picnic tables on campus	<a href="https://rb.gy/6akfae">https://rb.gy/6akfae</a>	\$139.00 x 2= \$278
Wood Assortment	Girls Garage	Treated 4x4 Posts and 2x4s for planning and constructing two frames for swings and a bridge.	<a href="https://rebrand.ly/severeweat">https://rebrand.ly/severeweat</a> <a href="https://rebrand.ly/40n42e9">herdd1ccd</a> <a href="https://rebrand.ly/40n42e9">https://rebrand.ly/40n42e9</a>	\$450.00
Swings	Girls Garage	Girls will plan, measure and build two swing sets on campus.	<a href="https://rb.gy/7daxco">https://rb.gy/7daxco</a>	\$31.38 x 2= \$62.76
Wood Swing	Girls Garage	Girls will plan, measure and build two swing sets on campus.	<a href="https://rebrand.ly/fd702e">https://rebrand.ly/fd702e</a>	\$94.74
Oven	STEM Chefs	For cooking to observe chemical changes.	<a href="https://www.lowes.com/pd/Hotpoint-30-in-Free-Standing-Electric-Range/5005506547">https://www.lowes.com/pd/Hotpoint-30-in-Free-Standing-Electric-Range/5005506547</a>	\$499 (+ \$180 for outlet install)
Pots & Pans	STEM Chefs	For cooking to observe chemical changes.	<a href="https://a.co/d/i7mzLln">https://a.co/d/i7mzLln</a>	\$124.99 x 2= \$249.98
Ozobots	Girls that Code	4 Ozobots are needed in addition to the current Ozobots at our school for coding exercises.	<a href="https://shop.ozobot.com/products/evo-entry-kit-1">https://shop.ozobot.com/products/evo-entry-kit-1</a>	\$175 x 4= \$700
ELECFREAKS Retro Coding Arcade	Girls that Code	Girls will construct and code their own arcade games.	<a href="https://a.co/d/eqLGmGA">https://a.co/d/eqLGmGA</a>	\$59.99 x 5= 359.95
Master Forensics Kit	Girls that Solve Crime	To set up a crime scene for a forensic investigation.	<a href="https://rebrand.ly/7pdavd8">https://rebrand.ly/7pdavd8</a>	\$813.25
Stream Ecology Testing Kit	Girls for the Environment	To test and monitor the health and chemical composition of the waterways on our campus.	<a href="https://www.acornnaturalists.com/stream-ecology-kit.html">https://www.acornnaturalists.com/stream-ecology-kit.html</a>	\$314.95
Locking Storage Cabinet	All Sections	For safe storage of all materials.	<a href="https://a.co/d/7VIcoEA">https://a.co/d/7VIcoEA</a>	\$159.99
				Tax: \$326.80
				Total: \$4995.36